

Fish Diseases & management

Aqua culture:

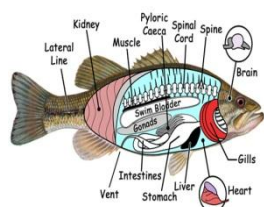
Def.

- **Culturing of any aquatic organism,**
- **Either of plant or animal origin,**
- **Under controlled condition or semi controlled condition.**

Aquatic organism

Def.

- **Any organism spend its entire life inside water**
- **Such as fish, shrimp, crabs, oysters, sea weeds, Etc.**



Aqua culture usually refers to:

1. Type of culture system:	<ul style="list-style-type: none"> - pond, - race way , - cage
2. Type of cultured organism:	<ul style="list-style-type: none"> - Fish, - shrimp, - crabs, - oyster, - sea weeds ... etc.
3. The environment of the culture:	<ul style="list-style-type: none"> - Fresh & brackish or marine water. - Cold or warm water.

Management Decisions:

1. **Economics.**
2. **Nutrition.**
3. **Biosecurity.**
4. **System design & Construction.**
5. **Monitoring & system Control.**

Importance of Aquaculture:

1. Food production:	<ul style="list-style-type: none"> - increase food production. - Especially animal protein. - With palatable taste. - increase nutritive value.
2. Employment:	<ul style="list-style-type: none"> - New sources of employment in rural area. - for development of this area & - arresting migration from rural to urban area.
3. Foreign Exchange:	<ul style="list-style-type: none"> - Earning foreign exchange through export.
4. Uses of Waste Lands:	<ul style="list-style-type: none"> - Using waste lands productively & - using organic waste for food production.
5. agro-industrial development:	<ul style="list-style-type: none"> - Promoting agro-industrial development. - <u>include:</u> <ul style="list-style-type: none"> - processing , marketing , - fishery products , feeds , culture ...

Systems of Aquaculture**Acc. To:**

1. Stocking density:	2. Cultured Spp.
<ul style="list-style-type: none"> 1. Extensive system. 2. Semi-intensive system. 3. Intensive System. 	<ul style="list-style-type: none"> 1. Monoculture. 2. Poly culture.

In each system you must know:

- 1. Def.
- 2. Advantages.
- 3. Disadvantages.

Systems of aquaculture acc. To stocking density:

Items	1. Extensive system.	2. Semi-intensive system.	3. Intensive system.
Def.	<ul style="list-style-type: none"> - rearing of aquatic organism - under natural condition - By low stocking density. - (1 fish / 10 m). - using large area of land without any external supplement. 	<ul style="list-style-type: none"> - rearing of aquatic organism - Under semi-controlled condition. - higher stocking density - (1 fish / m) - Fish at young age depend on natural food. - which given through fertilization - using (urea & super P) - After that ... External supplementation. 	<ul style="list-style-type: none"> - rearing of aquatic organism - under high stocking density - (10 fish / m²) - controlled condition on food & - Environmental parameters.
Advantages:	<ul style="list-style-type: none"> - Less water required - As there is no water exchange. - Low in incidence of fish diseases - Low labor & techniques required. 	<ul style="list-style-type: none"> - Higher fish production than extensive system (500 – 2500 Kg / ha). - Utilization of animal & poultry manure at young age so, can save food. 	<ul style="list-style-type: none"> - High production comparing with other systems. - great controlled in size of fish - Less land area required. - easily control of diseases - Easy harvesting.
Disadvantages	<ul style="list-style-type: none"> - Large land area required. - Very low productivity (100 Kg / ha). - control of diseases or problems - If occurred ... very difficult & cost. - great variation in size of fish - Difficult to control size. - Difficult harvesting. 	<ul style="list-style-type: none"> - Large area of land required. - Large amount of water. - Difficult to control diseases. - using organic fertilized causing problems as: <ul style="list-style-type: none"> - High incidence of parasitic diseases. - gill lesions. - Hypoxia (O₂ depletion). 	<ul style="list-style-type: none"> - More water & feed required. - More experienced labor required. - high risk of disease spreading & - environmental dis orders (as O₂ depletion)

N.B: ha = hectare = 2.5 fadan.

Systems of aqua culture Acc. To Cultured Spp.

Items	1. Mono culture	2. Poly Culture
Def.	<ul style="list-style-type: none"> - culturing of single Spp. Of fish. - such as: tilapia 	<ul style="list-style-type: none"> - culturing of more than one Spp. Of fish together in the same pound. - Such as: culturing of tilapia + common carp + silver carp & mullet together.
Advantages:	<ul style="list-style-type: none"> - Easy control of diseases - easy harvesting - No effort needed for sorting. 	<ul style="list-style-type: none"> - increase fish production through better utilization of natural food. - Improvement of dissolved O₂ level ... due to presence of some Spp. - As silver carp & tilapia which feed on excessive algae & organic matter. - controlling of undesired propagation of tilapia by introduction of carnivores fish as: <u>African cat fish</u> which feed on the larvae & fry of tilapia.
Disadvantages	<ul style="list-style-type: none"> - In case of feed imbalance ... - nutritional disorders ... due to: <ul style="list-style-type: none"> - Low amount of natural food. - Monoculture of some spp. As: tilapia - initiates development of <u>filamentous algae</u>. - Which may lead to : <ul style="list-style-type: none"> - Asphyxia & difficult harvesting. 	<ul style="list-style-type: none"> - Difficult harvesting & sorting of fish. - Difficult to use a balanced ration for all cultured spp. - Difficult to control of diseases or problems. - the risk of competition among different Spp. When unbalance stock may occur. - great variation in the size of fish.

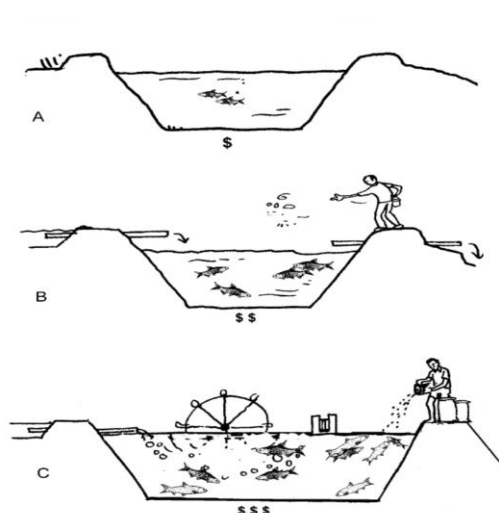
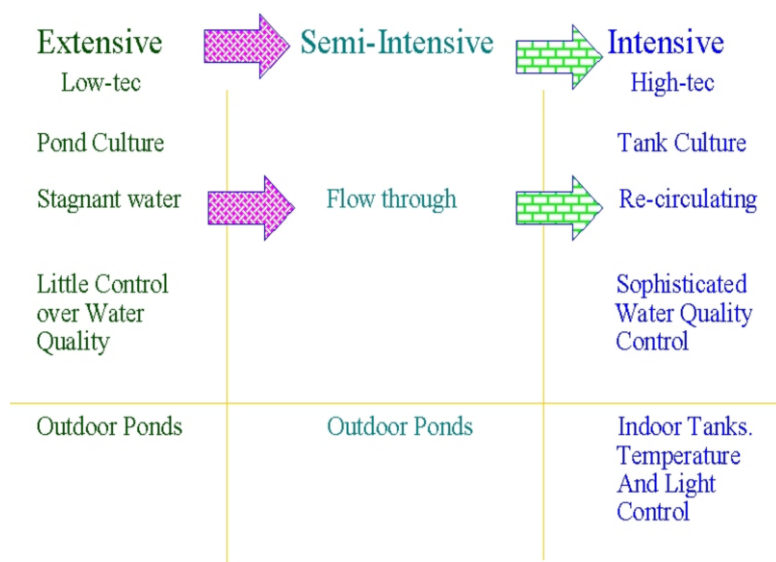


Figure 2: A: extensive, B: semi-intensive and C: intensive fish farming methods

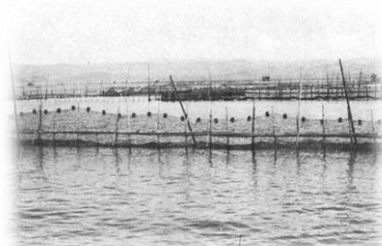


Design & construction of aqua farm

- Very important to insure the success of the project.
- The ideal site may not always be available. So, suitable design should overcome this problem.

Types of aqua farms

(1) Land based farms	(2) Water based farms
1. Earthen pond. 2. Race way (= Cement tank).	- Floating cages & pen and enclosure.



1. Land based farms:

1. Earthen ponds:

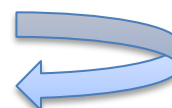
- Good design of the pond should allow:

- Effective waste management,
- Water exchange and harvesting.
- We should consider:

- 1. Type of fish pond
- 2. Size and shape.
- 3. Water depth.
- 4. Dike.
- 5. Pond bottom.
- 6. Water inlet & outlet.

1. Types of fish pond:

1. Nursing pond.
2. Rearing pond.
3. Production pond.
4. Other is used as: spawning – marketing – and winter pond.



Ponds are differentiated according to size:

- Fry rearing ponds: 100–5000 m²
- Fingerling ponds: 5000–20 000 m²
- Fattening ponds: 5–10 ha
- Market size production: >5 ha
- Specialised wintering ponds: 600–2000 m²
- Storage ponds: 0.2–10 ha (which may also be used for wintering)

2. Size and shape:

* Size of the pond:	* Shape of the pond.
<p>- Very large and small pond should be avoided.</p> <p><u>This is because:</u></p> <ol style="list-style-type: none"> 1. Very large pond takes long time to fill or to drain. (It should be possible to drain the pond completely in less than 72 hrs.) 2. Very small pond will result in large area used for embankment and water supply channels. 3. In addition, moderate size pond facilitates harvesting. 	<p>Irregular shaped pond not preferred</p> <ul style="list-style-type: none"> ❖ Rectangular shape is preferred to facilitate harvesting through harvesting sump using regular slope of the pond bottom. ❖ In rectangular pond, the long axis should be parallel to the prevailing wind to provide maximum aeration. ❖ Also square shaped ponds may be preferred ➤ In larger ponds, water may create higher waves ... result in great erosion of the dike

3. Depth of the pond: (water depth)

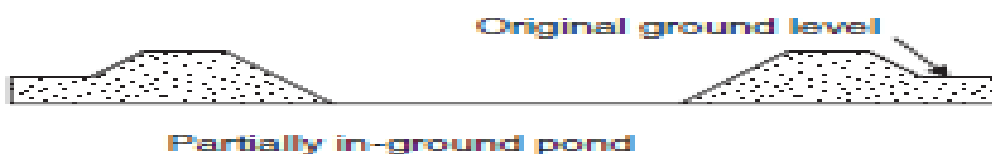
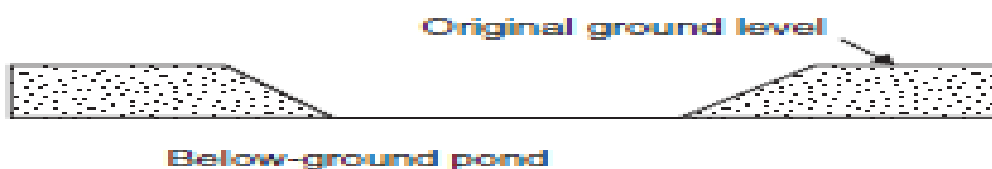
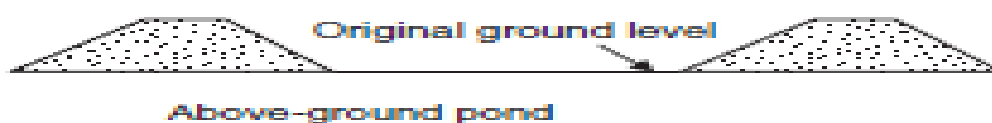
- depend on the type of the cultured fish.
- should range from 1 : 1.5 m and not exceed 3 m.

- Increase water depth result in:

- 1- Risk of oxygen deficiency because sun light can't reach deep water so No photosynthesis.
- 2- Risk of temperature stratification which may result in thermal shock.

4. Dike design and construction:

- ❖ Construction of the dike depends on:
 - The nature of the soil & depth & wave action and possible erosion.
- ❖ Dike can be constructed:
 - Above & below or
 - Partially above and partially below the original ground elevation.
- ❖ width of the main dike:
 - should be 6 m for heavy vehicles.
 - While secondary and tertiary dike could be narrow (3 m).



- Most dikes are constructed with slope 1:2 or 1:3.
- Compacting of the dike is carried out by bulldozer from every direction.
- Then the surface is covered with topsoil and seeded with grass to control erosion.
- The main dike should be graveled to prevent erosion.

5. Pond bottom:

- ❖ To facilitate drainage and harvesting of fish ,
- ❖ the pond bottom should have a slope 0.1- 0.2 %
- ❖ (10-20 cm for every 100m) toward the outlet
- ❖ Harvesting sump may be constructed in the deepest part,
- ❖ As a long canal 50 cm deeper or may be constructed outside the pond.

6. Water inlet and outlet:

- Turndown pipe or stand pipe.
- Most simple type of drainage is turndown pipes which protrude from the bond bottom.
- The lower end of the pipe is connected with rubber elbow; the other end of the elbow is jointed with a pipe passing through the dike.
- When this pipe is laid down, the pond can be drained.

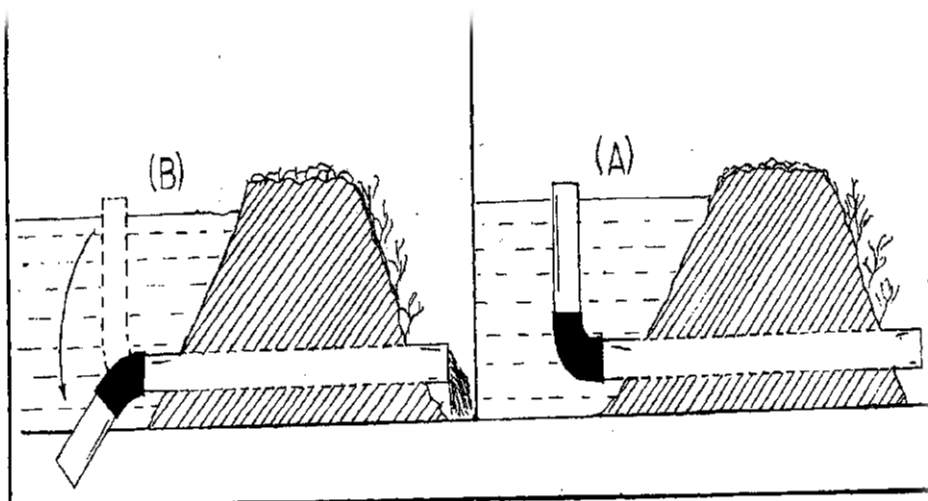
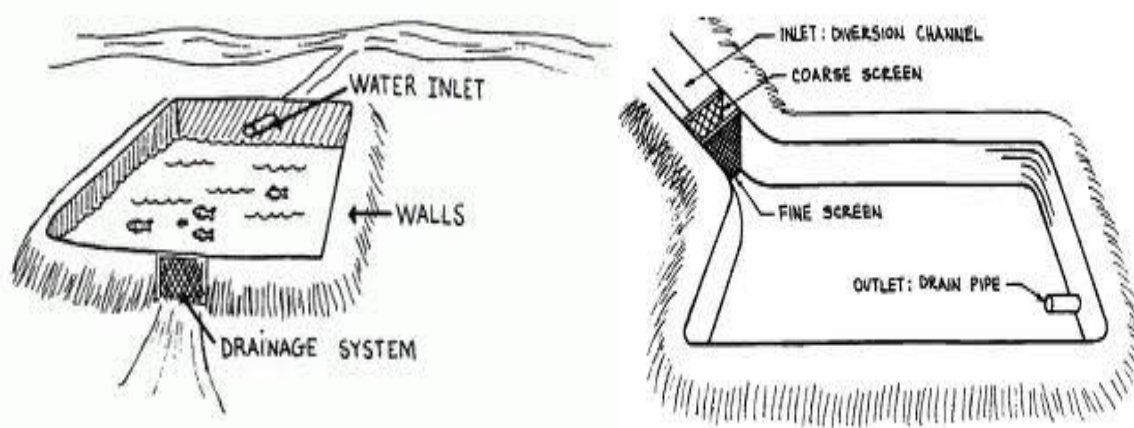


Fig (4-5) Diagram showing pond with stand pipe, during stope of drainage (A) and draining of pond (B)

- This method is effective and inexpensive.
- But, not suitable for large pond which greater diameter.



Monk

- consist of vertical tower.
- Which contain 3 pairs of grooves.
- In which wooden or control board and fish screens are connected.
- can drain the water in the surface & middle layer or bottom of the pond
- By removal of the wooden pieces in the control board.

2. Tank and raceway farm :

- ❖ Used for complete control on the cultured fish and high intensive culture.
- ❖ Tanks can be made of:
 - Concrete & fiberglass or
 - Metal free from toxic paints or chemicals.
- ❖ Circular or rectangular shaped tanks may be used.
- ❖ Rectangular tanks have different sizes and mostly measure:
 - 8 m long & 1 m width and 75 cm depth.
- * Raceways are smaller than ponds and mostly made of reinforced concrete or cement.

2. Water based farms

- Include: enclosures & pen and cages.

* Enclosure:

- means an enclosed natural bay closed from one side by man.

* Pen:

- means that all sides of the structure are man-made,
- Except the bottom which is formed by sea bed.

* Cage:

- means that all the structure even the bottom is man-made.

N.B

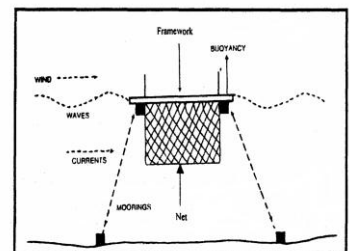
- ❖ Pen and enclosures have large size.
- ❖ While cage has small size so cage is more suitable for intensive culture.

Floating cages

Advantages	Disadvantages
<p>1- Suitable for <u>small and large scale production</u>.</p> <p>2- Lower cost than land based farms.</p> <p>3- Simple in construction not needs skilled labor.</p> <p>4- Easy:</p> <ul style="list-style-type: none"> - <u>Management &</u> - <u>Observation and</u> - <u>Harvesting</u> <p>5- Making the <u>maximum use of the existing water</u>.</p> <p>6- Easy expansion.</p>	<p>1- Fish are liable to <u>fin and skin damage</u> which represent a portal of entry for pathogens.</p> <p>2- Possible pollution of the aquatic environment through <u>wastes & sediments</u> and <u>altering of water current</u>.</p> <p>3- Easy spreading of diseases either <u>from or to fish in cages</u>.</p>

Selection of site of cage

- 1- Cage site should have good water quality &
- 2- free from toxic industrial wastes and
- 3- Have optimum pH , temperature , oxygen and salinity for the cultured species.
- 4- Sites which have high turbidity levels should be avoided.
- 5- The site should have good water exchange for flushing of wastes.
- 6- The current should be not excessive and not stagnant.
- 7- Should use sufficient depth to maximize water exchange.
- 8- Enough security is very important.
- 9- Periodical cleaning of nets.



Cage design and construction

- 1- Shape: Circular or square shaped cages are preferred.
- 2- Size: Mostly range from 100 -500 m³ (10 x 10 x 5).
- 3- The depth: should range from 3-4 m may reach 8 m
- 4- The bottom: of the cage should be above the muddy layer by at least 4-5 m.
- 5- Material: Should be strong & light and resist corrosion and fouling, also smooth in texture.
 - Nets made of nylon can be used
 - The frame is made up of wood and aluminum pipes.

Transportation of live fish

- The process of transportation of live fish is very important:

- To ensure arrival of fish from hatcheries to farm without losses and
- With minimal stress to avoid delayed mortalities.

- Precautions should be taken before transportation:

1- Fish are deprived from food for 12-24 hrs. Before transportation,

- To avoid fecal matter and subsequent deterioration of water.

2- Diseased & injured and weak fish should be discarded,

- As stress of transportation result in secretion of cortisol
- Which affects immunity.

3- Handling before or during transportation should be minimized to avoid stress.

4- Transportation is preferred in early morning,

- To decrease metabolism and stress on fish.

Transportation means

1. Plastic bags:	<ul style="list-style-type: none"> - Contain sufficient amount of oxygen. - May add light sedating agent as methane sulphonate to water - Bags may be surrounded by ice <li style="text-align: right;">* to prevent temperature increase.
2. Transportation tanks:	<ul style="list-style-type: none"> - Used for larger number of fish. - These tanks have round corners to minimize damages of fish - And connected with aeration equipment. - Or may inject liquid oxygen. - Water temperature should not exceed 18-20 C - and 10-15 for other species

Transportation tanks

- ❖ For short distances, half the bag is filled with water, the other half contains oxygen.
- ❖ In long distances, one third contain water, while the other 2 thirds contain oxygen.
- ❖ Tilapia and mullet are more sensitive to stress.
- ❖ May make water exchange in long distances during transportation
(half the amount to avoid shock)

